74. (New) An apparatus according to claim 57, further comprising a barrier disposed between the grip portion and the closed-loop five member linkage.

75. (New) An apparatus according to claim 57, further comprising a trocar disposed between the grip portion and the closed-loop five member linkage.

76. (New) An apparatus according to claim 57, wherein the at least one actuator includes one of a motor and a braking mechanism.

Remarks

Claims 44-50, 57-59 and 64-76 are pending. Claims 44 and 57 are the independent claims. Claims 44-50 and 57-59 stand rejected under 35 U.S.C. 103(a). Based on the above amendments and the following remarks, the Applicants respectfully request that the Examiner reconsider the outstanding rejection, and that it be withdrawn.

The Claims are Patentable over Jocobus Combined with Adelstein

Claims 44-48 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jacobus et al. (U.S. Patent No. 5,769,640), in view of Adelstein (A virtual Environment System For the Study of Human Arm Tremor).

The present invention, as recited by independent claim 44, relates to an apparatus having a user object, a closed-loop five member linkage and at least one sensor. The closed-loop five member linkage is "configured to enable the user object to move in a first rotary degree of freedom, a second rotary degree of freedom and a translational degree of freedom."

Jacobus et al. discloses an apparatus in which user manipulable objects (e.g., medical instruments) are coupled to four-axis devices, such that each user manipulable object is movable in three rotary degrees of freedom and in a linear degree of freedom. For example, Fig. 10 shows a four-axis reflecting module.

Adelstein discloses a five link closed chain joystick mechanism. As shown in Figure 4.3 and stated on page 62, in the system of Adelstein, "the handle shaft is simply an extension of one

of the links in the chain." In other words, the handle shaft is a monolithic part of one of the central members (associated with j_4).

As the Examiner noted in the Office Action, the Jacobus system does not have a closed-loop five member linkage as recited in independent claim 44. Adelstein cannot be combined with Jacobus to supplement this deficiency.

More specifically, Adelstein is not properly combinable with Jacobus because the functionality of the "translational degree of freedom" recited in independent claim 44 would be destroyed. In the five link mechanism of the Adelstein system, the handle is monolithically formed with one of the central members (associated with j_4). In other words, the handle in Adelstein is merely a fixed length extension of one of the members. As a result, the handle shaft of Adelstein is unable to move in any translational degree of freedom relative to the five link closed chain. Thus, substituting the four-axis device of Jacobus with the five link mechanism of Adelstein would destroy the "translational degree of freedom" recited in independent claim 44.

Thus, the invention as recited in independent claim 44 and its dependent claims is not disclosed in or suggested by Jacobus combined with Adelstein.

The Claims are Patentable over Jocobus Combined with Adelstein and Noll

Claims 57-59 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jacobus in view of Adelstein and U.S. Patent 3,919,691 to Noll.

The present invention, as recited by independent claim 57, relates to an apparatus having a user object, a closed-loop five member linkage, at least one sensor and at least one actuator. The closed-loop five member linkage is "configured to enable the user object to move in a first rotary degree of freedom, a second rotary degree of freedom and a translational degree of freedom."

Noll discloses a computer system with a three-dimensional tactile control unit, which makes use of assistive forces to overcome friction or inertia of a movable arm.

As discussed above, Jacobus combined with Adelstein does not disclose or suggest a five member linkage configured to enable the user object to move in translational degree of freedom as recited by independent claim 57. Noll adds nothing. The Examiner indicated in the Office

Action that Noll was being cited in reference to "cable and pulley," which are no longer cited in independent claim 57.

Thus, the present invention as recited in independent claim 57 and its dependent claims is not disclosed in or suggested by Jacobus combined with Adelstein and Noll for at least the reasons discussed above in connection with claim 44.

The Claims are Patentable over Jocobus Combined with Adelstein and Tuason

Claims 49-50 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Jacobus in view of Adelstein and U.S. Patent 5,403,191 to Tuason.

Claims 49 and 50 depend from independent claim 44. Thus, the present invention as recited in dependent claims 49 and 50 is not disclosed in or suggested by Jacobus combined with Adelstein and Tuason for at least the reasons discussed above in connection with claim 44.

Conclusion

All of the claims are in condition for allowance. Applicants believe that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment is respectfully requested.

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Respectfully submitted,
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